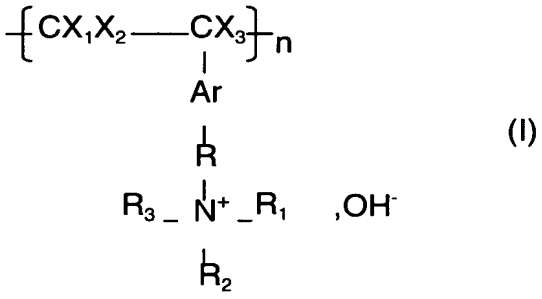
Claims

1. Alkali fuel cell comprising a solid stack consisting of a first electrode (2), a solid membrane (3) conducting hydroxide ions and a second electrode (4), each electrode (2, 4) comprising an active layer (2a, 4a) that is in contact with the solid membrane (3), cell (1) characterized in that the material forming the active layer (2a, 4a) of each electrode (2, 4) comprises at least a catalytic element, an electronic conductive element and an element conducting hydroxide ions, the element conducting hydroxide ions being a polymer having vinylaromatic units comprising a quaternary ammonium function and hydroxide counter-ions OH^- being associated with the quaternary ammonium functions of the polymer.

2. Cell according to claim 1, characterized in that the element conducting hydroxide ions is a polymer having styrenic units comprising a quaternary ammonium function and hydroxide counter-ions OH^- are associated with the quaternary ammonium functions of the polymer.

3. Cell according to claim 2, characterized in that the element conducting hydroxide ions is a polymer having the following general formula (I):



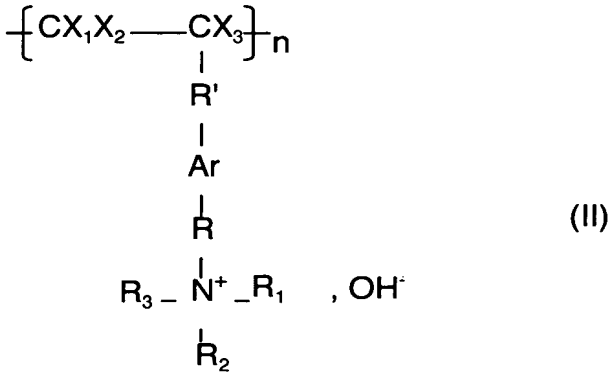
(I)

in which:

- X_1 and X_2 are both chosen from the group containing hydrogen, chlorine and fluorine,

- X_3 is chosen from the group containing hydrogen, chlorine, fluorine, an alkyl and a perfluorinated alkyl,
- Ar represents a possibly substituted, carbonated aromatic cycle,
- R is chosen from $-CH_2-$ and $-(CF_2)_{n1}-CH_2-$, with n1 comprised between 1 and 10, the $-CH_2-$ alkyl group of R being bonded by a simple covalent bond to the nitrogen of the quaternary ammonium function,
- R_1, R_2 and R_3 are respectively identical or different alkyl, aryl or alkyl-aryl groups,
- and n is an integer.

4. Cell according to claim 2, characterized in that the element conducting hydroxide ions is a polymer having the following general formula (II):



(II)

in which:

- X_1 and X_2 are both chosen from the group containing hydrogen, chlorine and fluorine,
- X_3 is chosen from the group containing hydrogen, chlorine, fluorine, an alkyl and a perfluorinated alkyl,
- Ar represents a possibly substituted, carbonated aromatic cycle,
- R is chosen from $-CH_2-$ or $-(CF_2)_{n1}-CH_2-$ with n1 comprised between 1 and 10, the $-CH_2-$ alkyl group being bonded by a simple covalent bond to the nitrogen of the quaternary ammonium function,
- R' is chosen from the group comprising oxygen, the $-O-CF_2$ group, and $-(CF_2)_{n2}-$ with n2 comprised between 1 and 10,

- R_1, R_2 and R_3 are respectively identical or different alkyl, aryl or alkyl-aryl groups,
- n is an integer.

5. Cell according to any one of the claims 1 to 4, characterized in that the electronic conductive element is chosen from the group comprising carbon, nickel, silver, gold and platinum.

6. Cell according to any one of the claims 1 to 5, characterized in that the catalytic element is chosen from platinum and silver.

7. Cell according to any one of the claims 1 to 6, characterized in that the catalytic element is formed by the electronic conductive element.

8. Cell according to any one of the claims 1 to 7, characterized in that the electronic conductive element being the support of the catalytic element and of the element conducting hydroxide ions, it is in the form of a fabric, a foam, a powder or a grid.

9. Cell according to any one of the claims 1 to 8, characterized in that the ionic conductivity of the solid membrane (3) conducting hydroxide ions is greater than or equal to 0.005 S/cm.

10. Cell according to any one of the claims 1 to 9, characterized in that each electrode (2, 4) comprises a diffusion layer (2b, 4b) so that the active layer (2a, 4a) is arranged between the diffusion layer (2b, 4b) and the solid membrane (3).